

## Appendix A

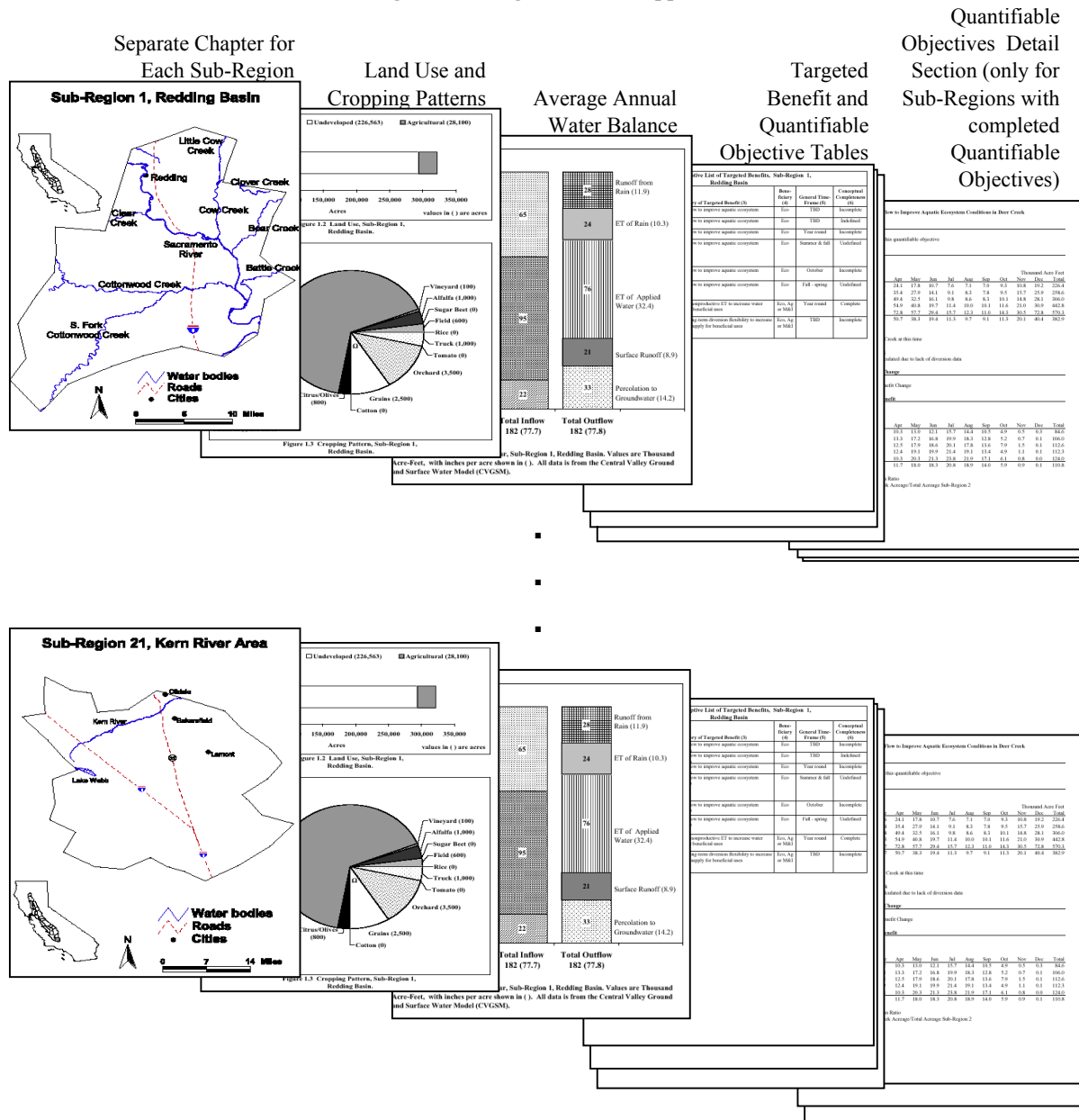
### Complete List of Quantifiable Objectives by Sub-Region

Appendix A contains a list of the completed and potential Quantifiable Objectives (QOs). To-date, 196 potential QOs have been identified. Of these, approximately 50 have been completed. WUE proposals that incorporate completed QOs will be given extra weight in the selection process.

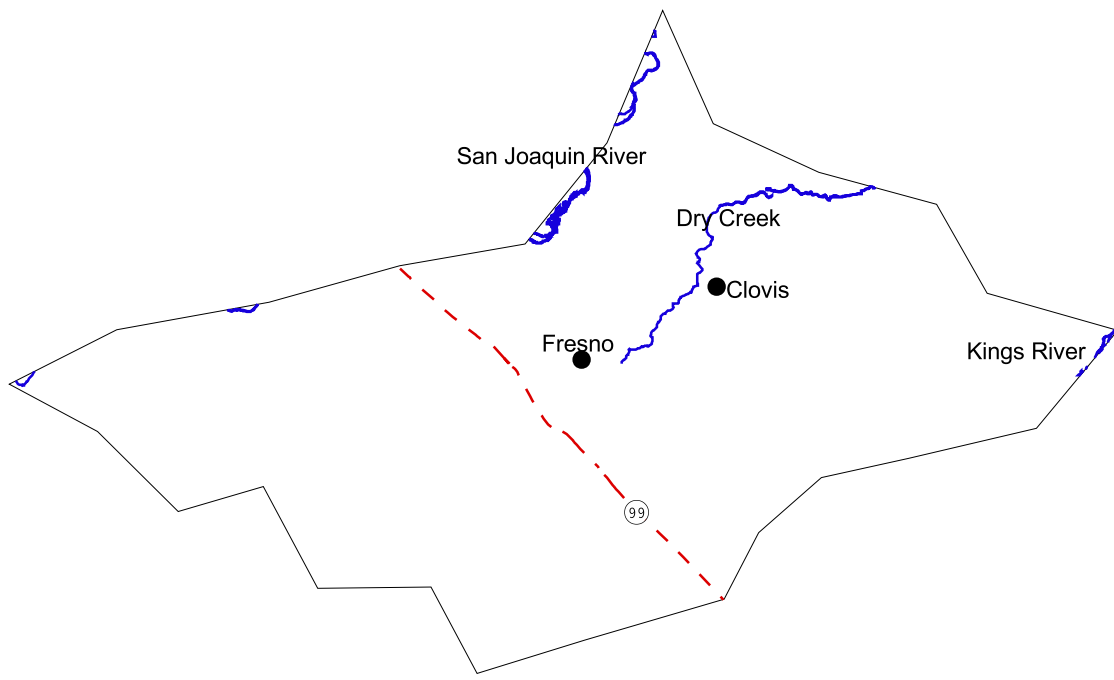
Readily available data does not exist to allow completion of the remaining QOs. However, approximately 45 of the uncompleted QOs have been identified as high priority, and proposals that are linked to these priority outcomes (or Targeted Benefits) will also receive extra weight in the selections (although not as much weight as those that incorporate completed QOs).

Appendix A is organized into 21 chapters that correspond to the 21 Sub-Regions defined in the QO analysis. Each chapter contains background information and details as illustrated in Figure A.I.

**Figure A.I. Organization of Appendix A**



# Sub-Region 16, Fresno Area



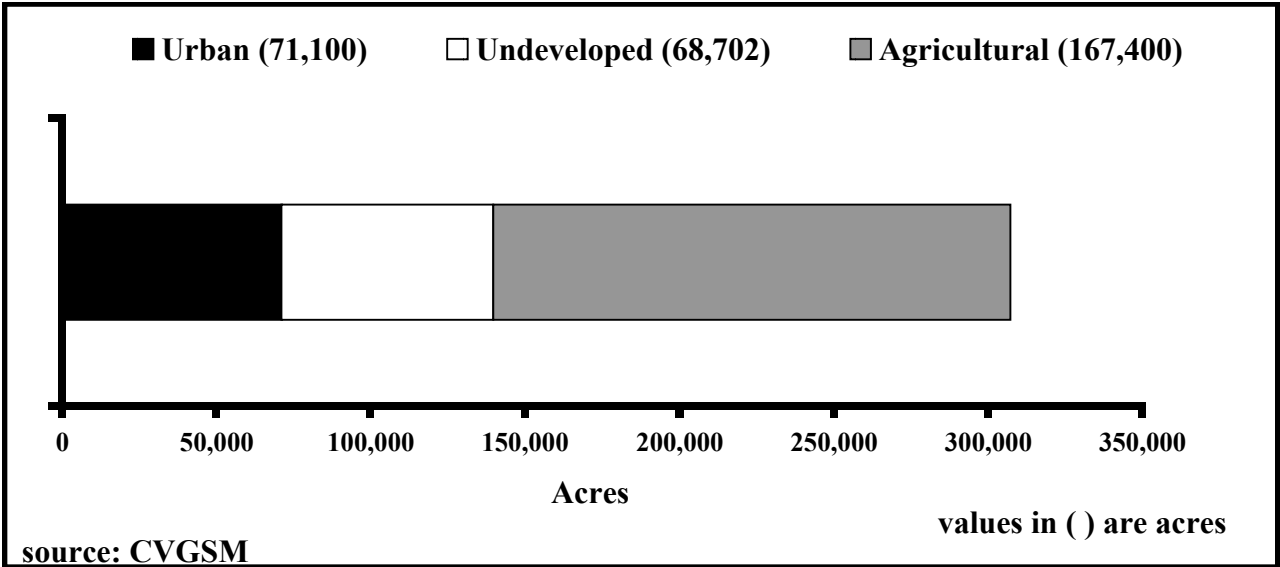
 **Water bodies**  
**Roads**  
**Cities**



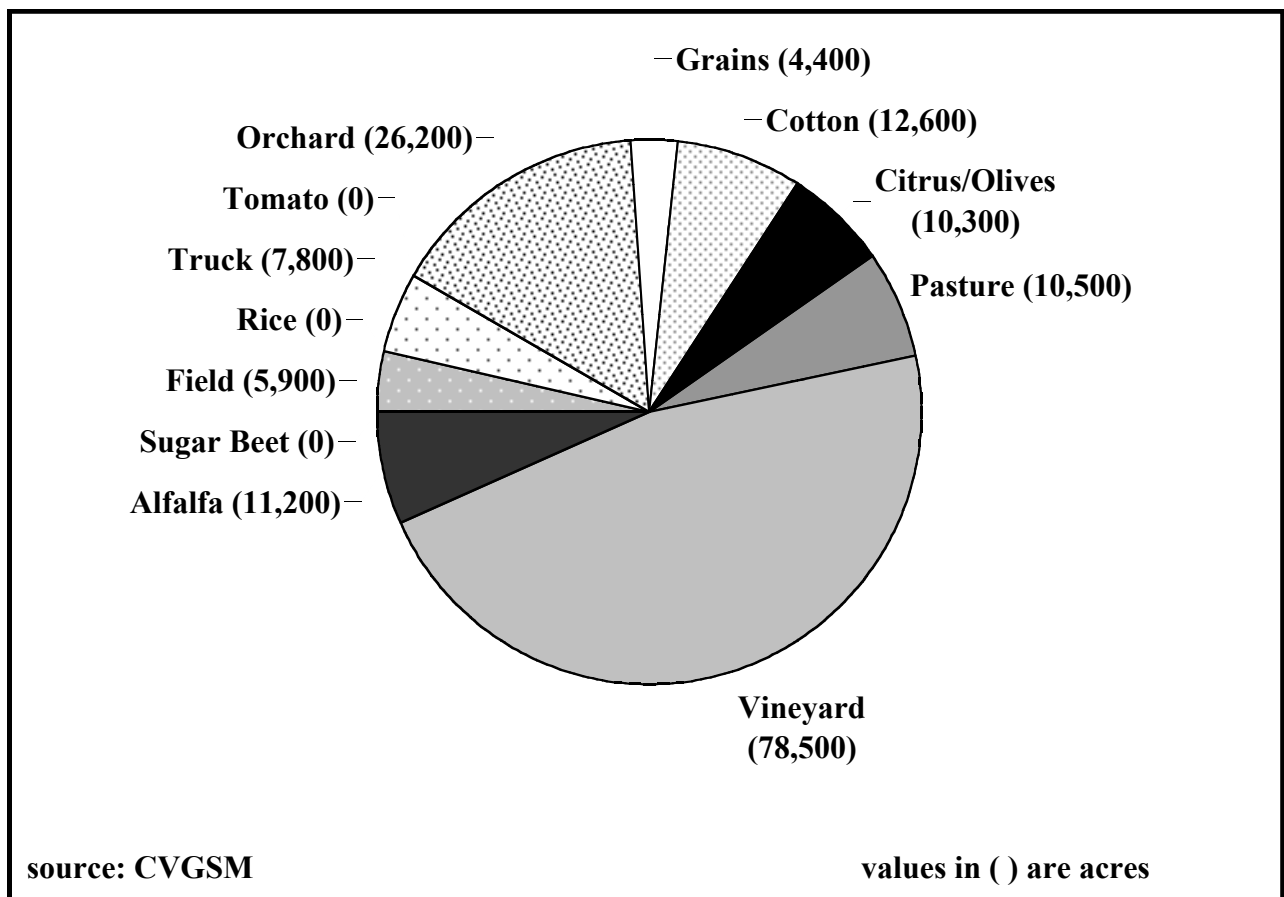
0 7 14 Miles



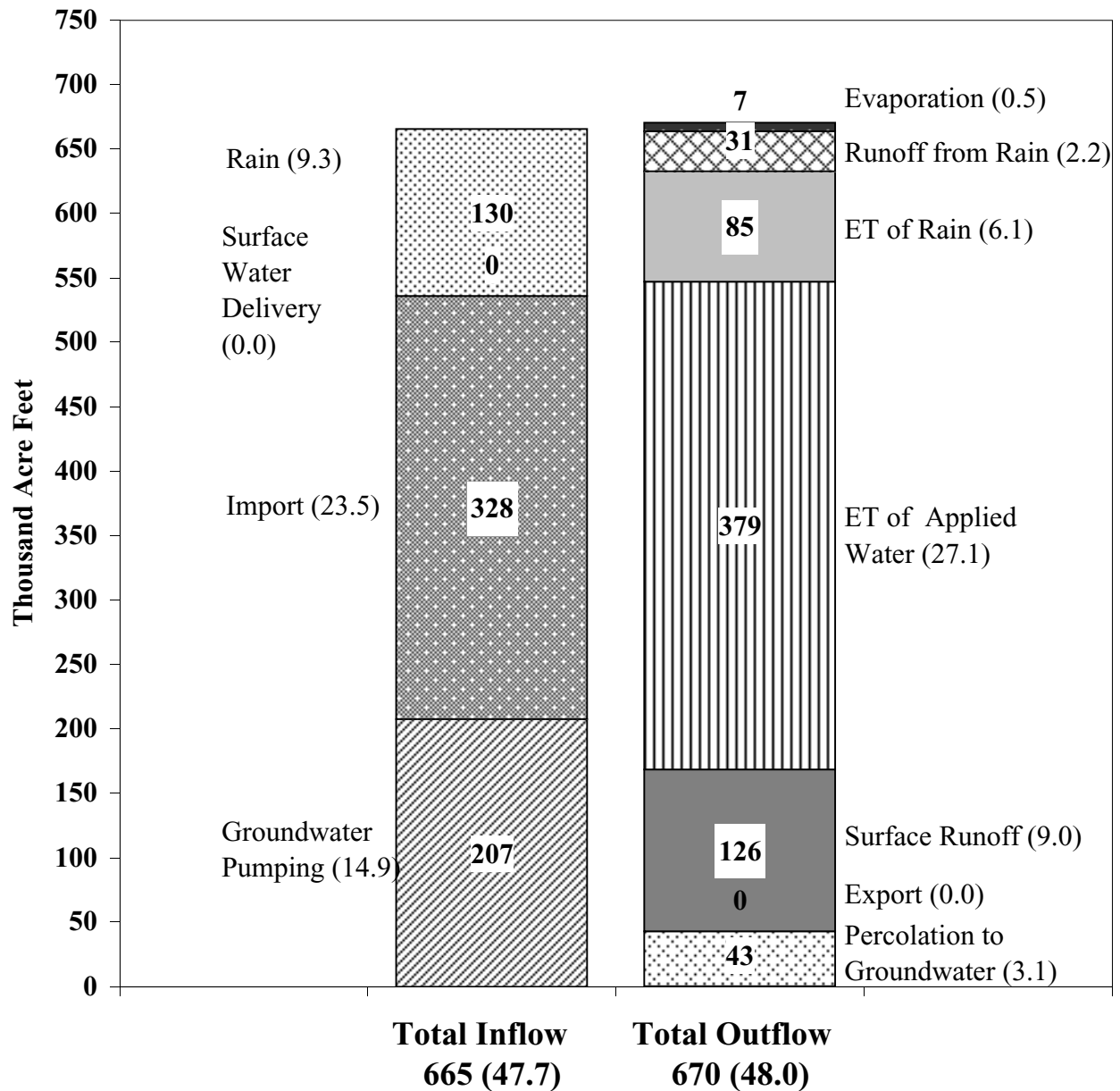
**Figure A.16.2 Land Use, Sub-Region 16,  
Fresno Area.**



**Figure A.16.3 Cropping Pattern, Sub-Region 16,  
Fresno Area.**



## Sub-Region 16 Water Balance



**Farm Water Balance, Average Year, Sub-Region 16, Fresno Area. Values are Thousand Acre-Feet, with inches per acre shown in ( ). All data is from the Central Valley Ground and Surface Water Model (CVGSM).**

**Table A.16.1. Descriptive List of Targeted Benefits, Sub-Region 16,  
Fresno Area**

<b>TB # (1) [duplicate]</b>	<b>Location (2)</b>	<b>Category of Targeted Benefit (3)</b>	<b>Bene- ficiary (4)</b>	<b>General Time- Frame (5)</b>	<b>Conceptual Completeness (6)</b>
171	San Joaquin River	Flow: Provide flow to improve aquatic ecosystem conditions	Eco	Fall	Incomplete
172	San Joaquin River	Quality: Reduce group A pesticides to enhance and maintain beneficial uses of water	Eco or M&I	TBD	Complete
173	San Joaquin River	Quality: Reduce pesticides to enhance and maintain beneficial uses of water	Eco or M&I	TBD	Complete
176	All affected lands	Quantity: Decrease nonproductive ET to increase water supply for beneficial uses	Eco, Ag or M&I	Year round	Complete
177	All suitable lands	Quantity: Provide long-term diversion flexibility to increase the water supply for beneficial uses	Eco, Ag or M&I	TBD	Incomplete
178	Salt affected soils	Quantity: Provide long-term diversion flexibility to increase the water supply for beneficial uses	Ag	Irrigation season	Complete

**Table A.16.2. Quantified Targeted Benefits, Sub-Region 16,  
Fresno Area**

TB # (1) [duplicate]	Source and Description of Quantified Targeted Benefit (7)
171	ERPP: Manage flow releases from tributary streams to provide adequate upstream and downstream passage of fall-run and late-fall-run chinook salmon, resident rainbow trout, and steelhead and spawning and rearing habitat for American shad, splittail, and sturgeon
172	303(d): Reduce [Group A pesticide] and DDT to ____.
173	303(d): Reduce chlorpyrifos and diazinon to ____.
176	Core: Reduce unwanted ET by ____ acre-feet per year.
177	Core: Enhance the effectiveness of potential conjunctive use programs by reducing flows to groundwater to ____ acre feet per year during periods of shortage; and increasing flows to groundwater to ____ acre feet per year during periods of excess.
178	Core: While remaining within the salinity threshold for a given crop, take advantage of periodic opportunities to reduce salinity impacts by increasing leaching by ____ during periods of excess supply and by reducing by ____ leaching during water short periods.

**Table A.16.3. Quantified Targeted Benefit Change, Sub-Region 16,  
Fresno Area**

<b>TB # (1) [duplicate]</b>	<b>Reference Condition</b>		<b>Quantified Targeted Benefit</b>		<b>Quantified Targeted Benefit Change</b>			<b>Specific Time-Frame (11)</b>
	<b>Data Source (8)</b>	<b>Availability (9)</b>	<b>Data Source (8)</b>	<b>Data Availability (9)</b>	<b>Data Source (8)</b>	<b>Availability (9)</b>	<b>Range of Values (10)</b>	
171	CVGSM	Unproven-precise	ERPP	Not available	Not available	Non-existent	Not available	Varies
172	TBD	TBD	TBD	Proven - precise	Calculated	TBD	TBD	TBD
173	TBD	TBD	TBD	Proven - precise	Calculated	TBD	TBD	TBD
176	CVGSM	Unproven-precise	Core	Rough estimate	Calculated	Rough estimate	7.3 TAF/yr	TBD
177	CVGSM	Unproven-precise	Core	Rough estimate	Calculated	Rough estimate	TBD	TBD
178	Core	Rough estimate	Core	Rough estimate	Calculated	Rough estimate	TBD	Irrigation season

Table A.16.4. Quantifiable Objective, Sub-Region 16, Fresno Area		
TB # (1) [duplicate]	Achievable Agricultural Potential (12)	Quantifiable Objective (13)
171	TBD	TBD
172	TBD	TBD
173	TBD	TBD
176	7.3 TAF per year plus additional water generated through reduction in application through improved irrigation systems	7.3 TAF per year plus additional water generated through reduction in application through improved irrigation systems
177	TBD	TBD
178	TBD	TBD

<b>Table A.16.5. Affected Flow Paths and Possible Actions, Sub-Region 16, Fresno Area</b>		
<b>TB # (1) [duplicate]</b>	<b>Affected Flow Paths (14)</b>	<b>Possible Actions (provided as examples; proposers are encouraged to consider local actions that are not listed) (15)</b>
171	TBD	TBD
172	TBD	TBD
173	TBD	TBD
176	ETAW	Reduce ET flows using improved irrigation methods, such as drip irrigation, and planting densities.
177	TBD	TBD
178	TBD	TBD

## Detail 176, Decrease Nonproductive ET, SubRegion 16

### Step 1. Quantified Targets

#### A. Acreage Assumed for Reduction of Nonproductive ET

source: CVGSM Sub-Region 16

Crop	Potential for ET Red.	Existing	Assumed for ET Reduction*	
			acres	percent
Pasture	No	10,500	0	0%
Alfalfa	No	11,200	0	0%
Sugar Beet	No	0	0	0%
Field	No	5,900	0	0%
Rice	No	0	0	0%
Truck	Yes	7,800	2,340	30%
Tomato	Yes	0	0	0%
Orchard	Yes	26,200	7,860	30%
Grains	No	4,400	0	0%
Vineyard	Yes	78,500	23,550	30%
Cotton	No	12,600	0	0%
Citrus and Olives	Yes	10,300	3,090	30%
Total		167,400	36,840	22%

\*The Assumed Acreage for ET Reduction is 30% of the crops that have the Potential for ET Reduction.

#### B. Existing ET for Sub-Region 16

source: CVGSM

Crop													Inches
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Pasture	---	---	---	---	---	---	---	---	---	---	---	---	---
Alfalfa	---	---	---	---	---	---	---	---	---	---	---	---	---
Sugar Beet	---	---	---	---	---	---	---	---	---	---	---	---	---
Field	---	---	---	---	---	---	---	---	---	---	---	---	---
Rice	---	---	---	---	---	---	---	---	---	---	---	---	---
Truck	0.00	0.00	0.00	2.60	2.90	3.30	3.40	1.80	1.30	1.20	0.00	0.00	16.50
Tomato	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	---
Orchard	0.90	1.30	1.70	2.90	4.90	6.00	6.70	5.70	3.50	2.10	1.00	0.70	37.40
Grains	---	---	---	---	---	---	---	---	---	---	---	---	---
Vineyard	0.00	0.00	0.00	1.00	3.70	5.80	6.60	5.50	3.50	1.30	0.00	0.00	27.40
Cotton	---	---	---	---	---	---	---	---	---	---	---	---	---
Citrus and Olives	0.00	0.00	1.90	2.70	4.20	4.80	5.00	4.20	2.80	2.00	0.00	0.00	27.60
Total	0.19	0.28	0.52	1.65	3.95	5.60	6.28	5.20	3.30	1.52	0.21	0.15	28.86

#### C. ET from Rain for Sub-Region 16

source: CVGSM

													Inches
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1) Critical	0.21	0.33	0.09	0.62	0.38	0.29	0.53	0.62	1.06	0.91	0.40	0.13	5.58
2) Dry	0.25	0.48	0.74	0.51	0.26	0.24	0.54	0.53	0.98	0.69	0.48	0.12	5.80
3) B Norm	0.42	0.66	0.75	0.76	0.44	0.12	0.45	0.45	0.88	1.08	0.45	0.01	6.46
4) A Norm	0.53	0.67	1.12	0.81	0.04	0.12	0.39	0.43	0.74	0.83	0.49	0.09	6.25
5) Wet	0.66	0.69	1.30	1.15	0.25	0.06	0.26	0.34	0.48	1.01	0.49	0.19	6.90
Wtd Avg.	0.39	0.54	0.74	0.75	0.27	0.18	0.44	0.49	0.85	0.89	0.46	0.11	6.12

D. Existing ETAW for Sub-Region 16

source: calculated = Step 1B.(Average Total) - Step 1C., (set to 0 if Step 1B. - Step 1C. <0)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1) Critical	0.00	0.00	0.43	1.03	3.56	5.31	5.76	4.58	2.25	0.61	0.00	0.02	23.54
2) Dry	0.00	0.00	0.00	1.14	3.68	5.36	5.75	4.67	2.32	0.84	0.00	0.03	23.80
3) B Norm	0.00	0.00	0.00	0.89	3.51	5.48	5.84	4.75	2.42	0.44	0.00	0.14	23.47
4) A Norm	0.00	0.00	0.00	0.84	3.91	5.48	5.90	4.77	2.56	0.70	0.00	0.06	24.21
5) Wet	0.00	0.00	0.00	0.50	3.69	5.54	6.02	4.86	2.82	0.51	0.00	0.00	23.94
Wtd Avg.	0.00	0.00	0.11	0.90	3.67	5.42	5.84	4.71	2.45	0.63	0.00	0.05	23.79

E. Target ETAW for Sub-Region 16

source: calculated = Step 1D. \* 90%

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1) Critical	0.00	0.00	0.38	0.92	3.21	4.78	5.18	4.12	2.02	0.55	0.00	0.02	21.18
2) Dry	0.00	0.00	0.00	1.03	3.31	4.83	5.17	4.20	2.09	0.75	0.00	0.03	21.42
3) B Norm	0.00	0.00	0.00	0.80	3.16	4.93	5.25	4.28	2.18	0.40	0.00	0.13	21.12
4) A Norm	0.00	0.00	0.00	0.75	3.52	4.93	5.31	4.29	2.31	0.63	0.00	0.06	21.79
5) Wet	0.00	0.00	0.00	0.45	3.32	4.98	5.42	4.38	2.54	0.46	0.00	0.00	21.55
Wtd Avg.	0.00	0.00	0.10	0.81	3.31	4.88	5.26	4.24	2.20	0.57	0.00	0.04	21.41

**Step 2. Reference Condition**

For ET Reduction the Reference Condition is the existing Crop ET, Step 1B.

**Step 3. Quantified Targeted Benefit Change**

A. Quantified Targeted Benefit Change for Sub-Region 16

source: calculated = Step 1D - Step 1E

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1) Critical	---	---	0.04	0.10	0.36	0.53	0.58	0.46	0.22	0.06	---	---	2.35
2) Dry	---	---	---	0.11	0.37	0.54	0.57	0.47	0.23	0.08	---	---	2.38
3) B Norm	---	---	---	0.09	0.35	0.55	0.58	0.48	0.24	0.04	---	---	2.33
4) A Norm	---	---	---	0.08	0.39	0.55	0.59	0.48	0.26	0.07	---	---	2.42
5) Wet	---	---	---	0.05	0.37	0.55	0.60	0.49	0.28	0.05	---	---	2.39
Wtd Avg.	---	---	---	0.09	0.37	0.54	0.58	0.47	0.24	0.06	---	---	2.37

B. Quantified Targeted Benefit Change for Sub-Region 16

source: calculated = Step 1D - Step 1E

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1) Critical	---	---	0.13	0.32	1.09	1.63	1.77	1.40	0.69	0.19	---	---	7.2
2) Dry	---	---	---	0.35	1.13	1.65	1.76	1.43	0.71	0.26	---	---	7.3
3) B Norm	---	---	---	0.27	1.08	1.68	1.79	1.46	0.74	0.14	---	---	7.2
4) A Norm	---	---	---	0.26	1.20	1.68	1.81	1.46	0.79	0.21	---	---	7.4
5) Wet	---	---	---	0.15	1.13	1.70	1.85	1.49	0.87	0.16	---	---	7.3
Wtd Avg.	---	---	---	0.28	1.13	1.66	1.79	1.45	0.75	0.19	---	---	7.3

**Step 4. Area Affected by Targeted Benefit**

Area affected are the 36,840 acres identified in Step 1A.

#### **Step 5. Water Flow Path Elements**

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The flow path elements used in this analysis are given in Step 1.

#### **Step 6. Idealized Agricultural Potential**

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Additional ET research is required to determine this component.

#### **Step 7. Achievable Agricultural Potential**

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The farm Available Agricultural Potential is the same as Step 3B.

#### **Step 8. Quantifiable Objective**

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A. For ET Reduction the Quantifiable Objective is Step 3B